

# SERVICE MANUAL



## 2 CHANNEL POWER AMPLIFIER GFA-5400

### TABLE OF CONTENTS

Introduction . . . . .	1
Version 1 vs. Version 2 . . . . .	1
Test Procedures . . . . .	1
Parts List . . . . .	2
Specifications . . . . .	6
Chassis Layout . . . . .	7
Version 1 Schematic . . . . .	8
Version 2 Schematic . . . . .	9

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## INTRODUCTION

This service manual is intended to assist trained and qualified technical personnel in verifying the performance of, adjusting, and repairing the ADCOM GFA-5400 amplifier. The procedures described here are not intended for persons unfamiliar with the appropriate safety and test procedures.



### WARNING



THERE ARE POTENTIALLY LETHAL VOLTAGES WITHIN THE GFA-5400 AMPLIFIER WHICH WILL BE ACCESSIBLE ONCE ITS TOP COVER IS REMOVED. **DO NOT ATTEMPT FAMILIARIZATION, INSPECTION, OR ANY PROCEDURE WHATSOEVER UNLESS YOU HAVE DISCONNECTED THE GFA-5400 FROM THE WALL AC OUTLET OR OTHER SOURCE OF AC POWER AND THE POWER-SUPPLY CAPACITORS ARE COMPLETELY DISCHARGED.** THESE INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY COMPETENT TECHNICAL PERSONNEL. **DO NOT UNDERTAKE ANY SERVICE PROCEDURES IN THE GFA-5400 UNLESS YOU ARE TECHNICALLY QUALIFIED TO DO SO.**

## VERSION 1 vs. VERSION 2

There are 2 versions of the GFA-5400 amplifier. The primary difference between the original version 1 and the updated version 2 is the addition of the ADCOM output protection circuit in version 2. This circuit can be noted by comparing the schematics of both versions in this manual. The protection circuit in version 2 includes trigger ICs IC711 and IC712 and a second power supply of standby transformer TT002, rectifier D701 and regulator IC701 that is mounted to a small circuit board at the right front hand side of the unit. The power transformer, speaker binding posts and input jacks are also unique to each version.

Besides these distinctions, the amplifier circuit, parts reference numbers and values are nearly identical in both units. Even so, a schematic diagram for both versions is included in this manual. The parts list is for version 2 but contains an addendum section to list parts exclusive to version 1. The board and chassis layout diagrams are for version 2 only. The alignment procedures are the same for both versions.

## TEST PROCEDURES

- All tests are performed with a 115V, low-distortion (less than 2% THD), AC-power source, 8-ohm resistive load (except slew rate), and a signal source of not more than 600 ohms.
- An 80kHz low-pass filter is employed during THD distortion measurements.
- Signal-to-noise measurements are "A" weighted.
- Damping factor is measured by comparing the 1-watt output voltage with and without an 8-ohm load.
- Slew rate is measured with an inductive load, and is derived with a dual-time-based oscilloscope reading the slope of a full power 5kHz square wave. **DO NOT OPERATE THE AMPLIFIER AT FULL-POWER SINE WAVE ABOVE 22kHz OR FULL-POWER SQUARE WAVE ABOVE 5kHz.**

### IMPORTANT

BEFORE PROCEEDING WITH ADJUSTMENTS, MAKE SURE AMPLIFIER IS AT ROOM TEMPERATURE.

**CORRECT BIAS ADJUSTMENT IS CRITICAL TO THE PERFORMANCE OF THIS AMPLIFIER. MAXIMUM OUTPUT POWER, MINIMUM THD AND HEAT DISSIPATION ARE AFFECTED BY THE BIAS SETTING AND MUST BE CORRECT TO MAINTAIN THE SONIC QUALITY AND LONGEVITY OF THE AMPLIFIER.**

### BIAS ALIGNMENT and DC OFFSET CHECK

Prior to performing BIAS ALIGNMENT and DC OFFSET CHECK turn unit on and allow to run with rated output for approximately **5 MINUTES** before attempting adjustments

Step	Coupling		Adjust	Adjust For
	Plus Lead	Minus Lead		
1	R675	R675	VR603	DC Voltmeter reads 35mV
2	R676	R676	VR604	
3	L SPKR +	L SPKR -	VR601	DC Voltmeter reads 0mV
4	R SPKR +	R SPKR -	VR602	

## **ADCOM** GFA-5400 SERVICE PARTS LIST

### **Power Supply PCB AF608615**

SCHEMATIC LOCATION	ADCOM PART NUMBER	DESCRIPTION
C901-C904	12005565	CAPACITOR ELECTROLYTIC 12000uF 63V
C905-C908	12001185	CAPACITOR MP 0.1uF 250V
C909-C912	12005420	CAPACITOR ELECTROLYTIC 1000uF 16V
C913-C916	12005195	CAPACITOR ELECTROLYTIC 470uF 100V
C917-C920	12001185	CAPACITOR MP 0.1uF 250V
D903-D914	16004003	DIODE 1N4003
R901-R904	27001590	RESISTOR 5.6K 1W MOF
R905-R912	27005030	RESISTOR ROED. 10 1/2W FUSABLE
R913-R916	27003280	RESISTOR ROED. 8.2K 2W 5% METAL
TH901, TH902	31000512	THERMISTOR SCK0512

### **Amplifier PCB AF608625, AF608635**

SCHEMATIC LOCATION	ADCOM PART NUMBER	DESCRIPTION
C601,C602	12003175	CAPACITOR STYROL 390pF 125V
C603,C604	12001260	CAPACITOR MP 2.2uF 100V
C605,C606	12005470	CAPACITOR ELECTROLYTIC 47uF 100V
C607,C608	12001020	CAPACITOR LAYER 1uF 50V
C609,C610	12005325	CAPACITOR ELECTROLYTIC 4.7uF 50V
C611,C612	12005280	CAPACITOR ELECTROLYTIC 47uF 50V
C613,C614	12001410	CAPACITOR STYROL 47pF 125V
C615,C616	12001285	CAPACITOR MYLAR 0.1uF 100V
C617,C618	12001420	CAPACITOR STYROL 22pF 125V
C711,C712	12005090	CAPACITOR ELECTROLYTIC 10uF 25V
C713,C714	12002070	CAPACITOR CERAMIC 0.01uF 50V
C715,C716	12005040	CAPACITOR ELECTROLYTIC 22uF 50V
C717,C718	12005080	CAPACITOR ELECTROLYTIC 100uF 16V
D601-D604	16000082	DIODE RD8.2JS-T1
D607-D616	16000082	DIODE RD8.2JS-T1
D711,D712	16004003	DIODE 1N4003
F601-F604	19000500	FUSE 5A 250V
IC711, IC712	21005550	TIMER IC NJM555D
Q601-Q604	33002100	TRANSISTOR IRFD210
Q605,Q606	33000610	TRANSISTOR IRF610
Q607,Q608	33009210	TRANSISTOR IRFD9210

<b>SCHEMATIC LOCATION</b>	<b>ADCOM PART NUMBER</b>	<b>DESCRIPTION</b>	
Q609,Q610	33009610	POWER TRANSISTOR	IRF9610
Q611,Q612	33002100	TRANSISTOR	IRFD210
Q613,Q614	33000610	POWER TRANSISTOR	IRF610
Q615-Q620	33002400 *(See Note 1)	POWER TRANSISTOR	IRFP240
Q621-Q626	33000924 *(See Note 1)	POWER TRANSISTOR	IRFP9240
Q627-Q630	33001016	TRANSISTOR	2SA1016G
Q631-Q634	33002362	TRANSISTOR	2SC2362F
Q635-Q638	33001016	TRANSISTOR	2SA1016G
Q711,Q712	33002274	TRANSISTOR	2SC2274E
Q713,Q714	33003478	TRANSISTOR	2SC3478T
Q715,Q716	33001016	TRANSISTOR	2SA1016G
Q717,Q718	33003478	TRANSISTOR	2SC3478T
R601,R602	27001565	RESISTOR ROED.	221 1/4W 1%
R603-R606	27002480	RESISTOR ROED.	1.82K 1/4W 1%
R607-R610	27004061	RESISTOR ROED.	51K 1/4W 1%
R611,R612	27002240	RESISTOR ROED.	7.5K 1/4W 1%
R613,R614	27002025	RESISTOR ROED.	1.54K 1/4W 1%
R617,R618	27002170	RESISTOR ROED.	470 1/4W 1%
R619, R620	27002030	RESISTOR ROED.	10K 1/4W 1%
R623,R624	27002030	RESISTOR ROED.	10K 1/4W 1%
R625,R626	27004290	RESISTOR ROED.	18.2K 1/4W 1%
R627-R630	27001565	RESISTOR ROED.	221 1/4W 1%
R631-R634	27001565	RESISTOR ROED.	221 1/4W 1%
R635,R636	27004061	RESISTOR ROED.	51K 1/4W 1%
R637,R638	27001515	RESISTOR ROED.	4.75 1/4W 1%
R639-R642	27002010	RESISTOR ROED.	100 1/4W 1%
R643,R644	27001530	RESISTOR ROED.	2.74K 1/4W 1%
R645,R646	27002030	RESISTOR ROED.	10K 1/4W 1%
R647-R650	27002410	RESISTOR ROED.	4.7K
R651-R654	27001520	RESISTOR ROED.	68
R655-R670	27001565	RESISTOR ROED.	221
R671,R672	27002095	RESISTOR ROED.	2.21K
R673,R674	27001590	RESISTOR	5.6K 1W MOF
R675-R686	27003155	RESISTOR	0.56 3W MOF
R687,R688	27004475	RESISTOR	5.6 2W MOF
R691,R692	27002020	RESISTOR ROED.	1K 1/4W 1%
R693-R696	27002010	RESISTOR ROED.	100 1/4W 1%
R711,R712	27002030	RESISTOR ROED.	10K 1/4W 1%
R713,R714	27002095	RESISTOR ROED.	2.21K 1/4W 1%
R715,R716	27001090	RESISTOR	220K 5%
R717,R718	27002020	RESISTOR ROED.	1K 1/4W 1%
R719,R720	27002200	RESISTOR ROED.	4.99K 1/4W 1%
R721,R722	27002440	RESISTOR ROED.	33.2K 1/4W 1%
R723,R724	27002365	RESISTOR ROED.	49.9K 1/4W 1%
R725,R726	27001530	RESISTOR ROED.	2.74K 1/4W 1%
R729,R730	27002150	RESISTOR ROED.	3.32K 1/4W 1%
S601, S602	32005400	THERMAL BREAKER (85°C)	
VR601-VR604	35001225	POTENTIOMETER	BOARD MOUNT 4.7K

**Power Switch PCB  
AF608645**

<b>SCHEMATIC LOCATION</b>	<b>ADCOM PART NUMBER</b>	<b>DESCRIPTION</b>	
C921	12005700	SPARK KILLER 4700pF	KC472M
C922	12001605	MOV (120V operation)	TNR12G241K
C922	12001615	MOV (240V operation)	TNR12G431K
PW901	37001325	POWER SWITCH	
TH903	31002512	THERMISTOR	SCK2R512

**Protection Circuit Power Supply PCB  
AF608665**

<b>SCHEMATIC LOCATION</b>	<b>ADCOM PART NUMBER</b>	<b>DESCRIPTION</b>	
C701	12005070	CAPACITOR ELECTROLYTIC	1000uF 35V
C702	12005120	CAPACITOR ELECTROLYTIC	220uF 16V
D701	16001530	BRIDGE	
F701	19000100	FUSE	1A 250V
IC701	21007800	REGULATOR IC	NJM7812A
TT002	24005002	STANDBY TRANSFORMER	

**Other Hardware**

<b>SCHEMATIC LOCATION</b>	<b>ADCOM PART NUMBER</b>	<b>DESCRIPTION</b>	
D901,D902	16001540	BRIDGE RECTIFIER	MP154
F001	19000800	FUSE (120VAC operation)	8A 250V
F001	19000400	FUSE (240VAC operation)	4A 250V
	20005200	FUSE HOLDER	
D001, D002	16001204	THERMAL LED (Red)	LTL-1204A
	16001204	POWER LED (Red)	LTL-1204A
	16001254	DISTORTION LED (Yellow)	LTL-1254A
	11001155	PLASTIC POWER BUTTON	
	11001040	BUTTON SPRING	
	11001165	BUTTON MOUNTING RING	
	11001170	CLEAR BUTTON INSERT	
	15001050	POWER CORD	
	15001150	CORD STOPPER	
	13005403	PRINTED REAR CHASSIS	
	24005401	POWER TRANS. (VER. 2)	
	22001170	INPUT JACK (VER. 2)	
	13005400	TOP COVER	
	13001020	FOOT	
	30005800	SPEAKER POST (VER. 2)	
	13005401	FRONT PANEL	

## PARTS EXCLUSIVE TO VERSION ONE OF THE GFA-5400

(VERSION WITHOUT STANDBY POWER SUPPLY AND LM 555 PROTECTION CIRCUITRY)

SCHEMATIC LOCATION	ADCOM PART NUMBER	DESCRIPTION	
D605,D606	16000082	DIODE	8.2V ZENER
R615,R616	27004300	RESISTOR	15K
R621,R622	27004200	RESISTOR	10K
PJ1,PJ2	22001370	INPUT JACK, Board Mount	
	30001045	SPEAKER POST RED	
	30001035	SPEAKER POST BLACK	
Q639,Q640	33002362	TRANSISTOR	2SC2362
T1	24005400	POWER TRANSFORMER	

\* Note 1: Matched IRFP240 and IRFP9240. Due to manufacturing variations in the turn on voltage of these devices, these parts must be replaced in matched sets of 3. If any one of the output devices fails, all three must be replaced. For example, if Q616 fails in the right channel, then all 3 of the N-channel IRFP240 devices must be replaced in that channel (Q616, Q618, Q620). When ordering these parts, specify a matched set of 3. Failure to use matched devices will cause "current hogging" by one of the output devices. Proper bias alignment will not be possible in this circumstance leading to incorrect and, possibly, unreliable operation.

## **ADCOM** GFA-5400 SPECIFICATIONS

### **Power Rating (To FTC Requirements)**

125 watts continuous average power per channel into 8 ohms at any frequency between 20Hz to 20kHz with all channels driven at less than 0.18% THD  
200 watts continuous average power per channel into 4 ohms at any frequency between 20Hz to 20kHz with all channels driven at less than 0.18% THD

### **IM Distortion (SMPTE)**

1 watt to 125 watts into 8 ohms ..... ≤ 0.05%  
1 watt to 200 watts into 4 ohms ..... ≤ 0.05%

### **IM Distortion (CCIF, Any Combination from 4kHz to 20kHz)**

125 watts into 8 ohms ..... ≤ 0.035%  
200 watts into 4 ohms ..... ≤ 0.035%

### **THD + Noise at 130 watts into 8 ohms (Typical)**

20Hz ..... 0.018%  
1kHz ..... 0.02%  
10kHz ..... 0.07%  
20kHz ..... 0.14%

### **THD + Noise at 200 watts into 4 ohms (Typical)**

20Hz ..... 0.018%  
1kHz ..... 0.02%  
10kHz ..... 0.08%  
20kHz ..... 0.165%

**Frequency Response @ 1 Watt into 8 ohms (10Hz to 20kHz)** ..... +0, -0.25dB

**Power Bandwidth (-3dB)**..... 3Hz to 130kHz

**Dynamic Headroom into 4 ohms** ..... 1.7 dB

**Signal to Noise Ratio, "A" Weighted (125 watts into 8 ohms)**..... ≥ 100dB

**Gain**..... 29dB

### **Input Sensitivity**

for 1 Watt ..... 0.1 volts  
for 125 Watts ..... 1.125 volts

**Input Impedance**..... 49.9KΩ

**Damping Factor (20Hz to 20kHz)** ..... ≥ 500

**Rise Time (5kHz, 90V, peak-to-peak square wave, 20% to 80%)** ..... 1.9μS

### **Power Consumption (Continuous, All Channels Driven)**

Quiescent ..... 150VA  
Maximum ..... 960VA  
125 watts into 8 ohms ..... 580VA  
200 watts into 4 ohms ..... 920VA

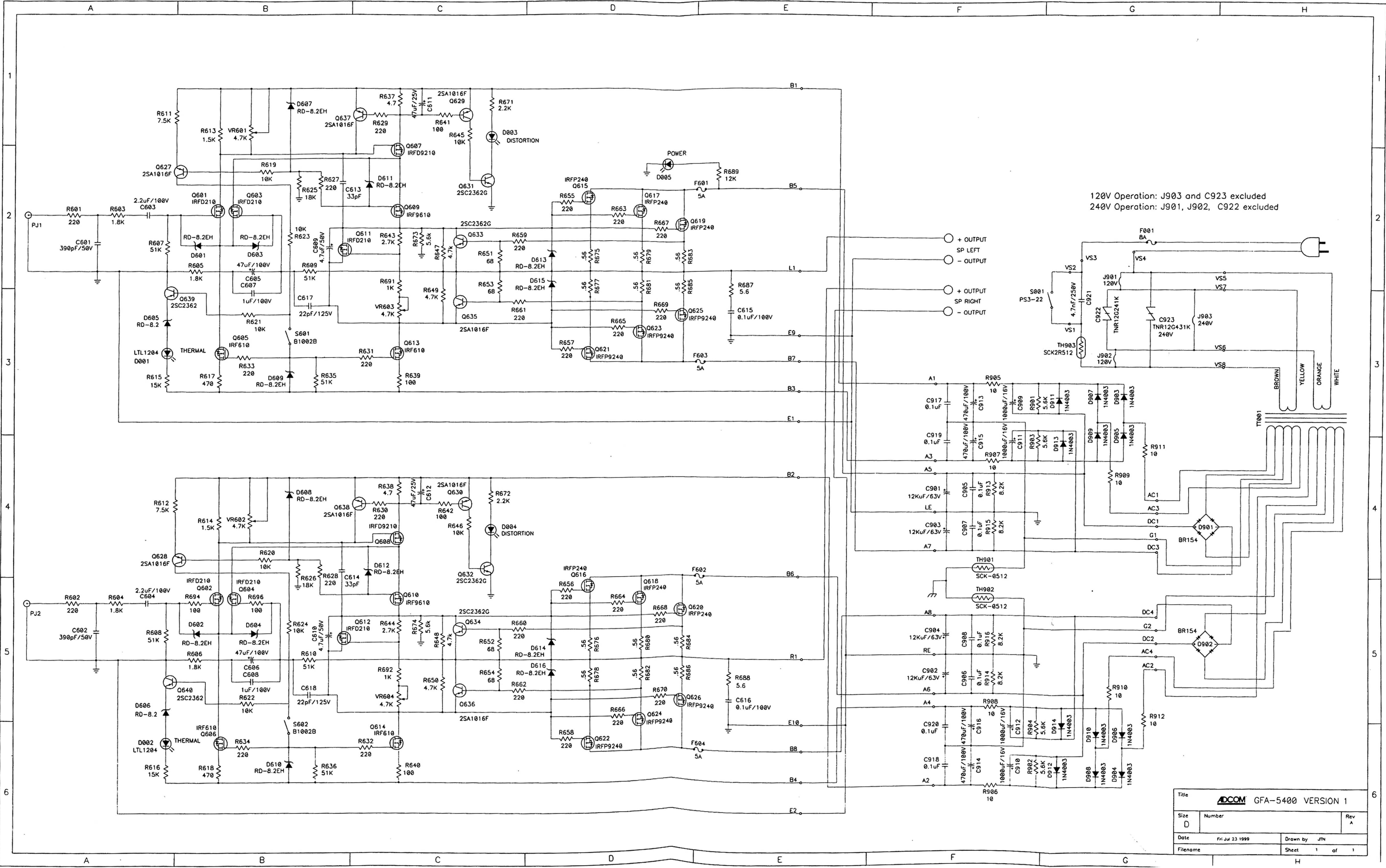
**Power** (Available in 230VAC on special order) ..... 115VAC - 50/60Hz

**Chassis Dimensions** ..... 5" (127mm) x 17" (432mm) x 11.5" (292mm)

**Maximum Dimensions** ..... 5<sup>3</sup>/<sub>8</sub>" (137mm) x 17" (432mm) x 12.5" (375mm)

**Weight**..... 26 lb. (11.8 kg)

**Weight, Packed**..... 30 lb. (13.6kg)



120V Operation: J903 and C923 excluded  
240V Operation: J901, J902, C922 excluded

Title			ADOM GFA-5400 VERSION 1		
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